



STRATIGRAPHY

This series of regional cross sections presents the interpreted structural and stratigraphic framework of the Illinois Basin. Existing stratigraphic problems are pointed out on these regional cross sections and are discussed below. Developing solutions for these problems, however, is beyond the present scope of this project.

Rather than introduce new terminology on the cross sections, we use the stratigraphic nomenclature used in the various states in several recent publications (Shaw 1985; Wilman et al. 1975; Howe 1965; McDowell et al. 1981; Adair et al. 1987).



Canadian Series

Strata of the Canadian Series (Ordovician) are restricted to the subsurface in southern Illinois and western Kentucky, but they crop out along the eastern flank of the Ozark Dome in Missouri. In Missouri these strata are subdivided into four formations. In ascending order, they are the Gower, Clinton, and the Clinton Member at its base, the Reelfoot Formation, and the Jefferson City, Collier, Powell, and Smithville Members (Thompson 1969; Adair 1987). In Kentucky the Gower through the Collier Formations are recognized, although the Clinton is considered a separate formation (Shaw 1985; McDowell et al. 1981). The Powell and Smithville are not recognized in Kentucky. If present in Kentucky, these units are included in the unnamed argillaceous unit, mentioned below, or the Collier Dolomite.

In southern Illinois, the strata of the Canadian Series are assigned to the Pierre du Chemin Group (Shaw 1985; p. 18; Wilman and Buchach 1975), formerly subdivided into three formations. In ascending order, they are the Gower, Sandstone, and the Clinton and Shalopine Members. The Gower has a patchy distribution, and where it is absent, its position is recognizable in outcrops and core only by occasional sand grains near the base of the Clinton.

The Gower of Kentucky and Missouri is equivalent to the Ordovician, except that Missouri, the Gower includes the Clinton, the Gower is a basal member. The Reelfoot correlates with the New Reelfoot Sandstone of west-central and northern Illinois. In the west-east cross section that extends from Missouri to Kentucky the Reelfoot is a separate formation in southern Illinois in those it is probably correlated from the adjacent states where it is formally recognized. The Shalopine in Illinois has not been further subdivided. Correlating the other Missouri units to the Shalopine was beyond the scope of this project, as lithologic differences are commonly defined on the basis of unstable features and are too subtle to be detected on available logs.

Unnamed Argillaceous Dolomite Overlying Shalopine

A shaly or argillaceous dolomite unit, previously unrecognized as distinct from and overlying the Shalopine Dolomite, is present only in wells in the southern part of Illinois and adjacent parts of western Kentucky and possibly northeastern Indiana. It is thickest in the Pickel well (33C-1), Union County, Illinois, the strata well (70B-1), Pope County, Illinois, and the Davis well (48D-1), Crittenden County, Kentucky. It is present, although thin, as far north as the Casey well, Henderson County, Illinois. The unit is absent in the Stephens well, Caldwell County, Kentucky, and the Duncan well, Webster County, Kentucky, even though these wells are located in the Rough Creek Graben. As in the Stephens and Duncan wells, the Shalopine equivalent is anomalously thin, which suggests that these two wells penetrate hard blocks upland and eroded during the major drop in sea level that resulted in formation of the sub-Tippesaw unconformity. The unnamed shaly dolomite unit may have been deposited prior to block uplift and eroded from these structurally high areas, in which case the unit is part of the Sauk Sequence. Alternatively, the southernmost part of the basin, including the areas of the Pickel, Smith, Davis, and adjacent wells, may have remained submerged and thereby experienced continuous deposition when the shallow parts of the basin, including the upland hard blocks, were subaerially exposed. The unnamed shaly dolomite may represent that continuous deposition. The shaliness may reflect an initial lower Tipton Sequence influx of clay and sand from the basin margins that event was followed by deposition of sandstones. By this scenario the unnamed shaly dolomite is part of the Tipton Sequence.

Everton-St. Peter

The upper part of the Everton Dolomite and the lower part of the St. Peter Sandstone (Ordovician) appear to be facies of one another. The St. Peter is the nearshore periall and subtidal facies of the more seaward Everton (Dorland and Shaw 1983). The Everton is a sandy dolomite that may contain thick St. Peterian sandstones where these sandstones are overlain by a carbonate.

Joachim-Dutchman

Joachim and Dutchman Formations (Ordovician) Window (1984, p. 321, 352) and McDowell (1937, p. 32) defined the Joachim as a dolomite in its type area and the Dutchman as principally a limestone. In the subsurface, however, both units may be dolomite and/or limestone, thereby eliminating the main distinguishing characteristic. The lower part of the combined unit is generally shaly, as evidenced by higher readings on the gamma ray logs, but this criterion has not been used in the past as a distinction between the units.

Mammoth Cave Group

Carbonates of the Mammoth Cave Group (Mississippian) are difficult to subdivide, since the contacts between the formations are gradational. More work and more core data are needed to work out the facies relations of this carbonate group. In these cross sections, we have attempted to correlate the formations basinwide as they have been defined in the past to aid those who use those subdivisions.

STRUCTURE

The structural configuration between the wells was taken primarily from available regional structure maps; the base of the Beach Creek in Illinois by Braden (1967), the base of the New Albany in Illinois by Clift et al. (1981), the base of the New Albany in Kentucky by Schwall and Potter (1976), the top of the Galena in Illinois by Braden and Buchach (1973), and the base of the Reelfoot in Missouri by McGovern (1971). Other data, such as bedrock geologic maps, were checked and the most reasonable interpretations were depicted on the sections.

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